

### [54] ENGINES AND COMPRESSORS

[75] Inventor: **Archibald John Stephen Baker**,  
Childrey, near Wantage, England

[73] Assignee: **Exxon Research and Engineering Company**, Linden, N.J.

[22] Filed: **Nov. 25, 1974**

[21] Appl. No.: **526,457**

### Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 240,394, April 3, 1972, abandoned.

[52] U.S. Cl. .... **91/493; 123/44 D; 74/44**

[51] Int. Cl.<sup>2</sup> .... **F01B 13/06; F16H 21/22; F02B 57/00**

[58] Field of Search ..... **91/493, 491; 92/72, 92/73; 417/273; 123/44 D; 74/44, 49**

### [56] References Cited

#### UNITED STATES PATENTS

973,739	10/1910	Aluergnat .....	417/273
2,472,647	6/1949	Lovins .....	74/49
2,683,422	7/1954	Richards, Jr. ....	91/493
2,831,438	4/1958	Guinard .....	91/493
2,936,632	5/1960	Dalmer .....	74/49
3,195,420	7/1965	Johnnsen .....	74/49
3,258,992	5/1966	Hittell .....	74/49
3,410,477	11/1968	Hartley .....	417/534
3,431,865	3/1969	Coon et al. ....	417/273
3,685,923	8/1972	Hutchins .....	417/273

Primary Examiner—William L. Freeh  
Attorney, Agent, or Firm—D. F. Wholers

### [57] ABSTRACT

A piston and cylinder machine for use as a prime mover, pump or compressor in which there are at least two pairs of pistons and cylinders for each crankpin, the cylinders of each pair being disposed on opposite sides of the crankpin and rigidly connected to each other by a yoke. For each cylinder pair, there is rotatably and eccentrically mounted on the crankpin a disc rotatably received in a respective yoke and whose eccentricity relative to the crankpin is equal to that of the crankpin relative to the crankshaft whereby the piston stroke is twice the crankpin throw. The discs are integral with each other within their superimposed peripheries so that a short, stiff crankpin may be used, and they are out of phase by twice the angular separation of the pairs of cylinders. No phasing gears are provided between the discs and the crankcase and/or crankshaft, and side forces on the pistons are reacted against the cylinder walls through the provision of a springy, thin hard metal wear shim lubricated by a wedge of lubricant trapped between the wear shim and cylinder walls. All secondary out-of-balance forces are eliminated. The regulation of fluid into and out of each cylinder is by a rotary valve the sealing forces of which are regulatable and depend on the cylinder pressures.

**17 Claims, 18 Drawing Figures**

